

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
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AUG 08 2002

MORRISON & FOERSTER, LLP

INVITATION TO PAY ADDITIONAL FEES

(PCT Article 17(3)(a) and Rule 40.1)

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Applicant's or agent's file reference 37372202640	Date of mailing (day/month/year) 30/07/2002
International application No. PCT/US 02/ 07923	International filing date (day/month/year) 28/02/2002
Applicant LIGHTWAVE MICROSYSTEMS CORPORATION	

1. This International Searching Authority

(i) considers that there are 09 (number of) inventions claimed in the international application covered by the claims indicated ~~below~~ on the extra sheet:

and it considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated ~~below~~ on the extra sheet:

(ii) ☒ has carried out a partial international search (see Annex) ☐ will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

2-3 with 1; 17 with 16 & 1; 22-23 with 21

(iii) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid

2. The applicant is hereby **invited**, within the time limit indicated above, to pay the amount indicated below:

EUR 945,00 x 08 = EUR 7.560,00
 Fee per additional invention number of additional inventions total amount of additional fees

Or, _____ x _____ = _____

The applicant is informed that, according to Rule 40.2(c), the payment of any additional fee may be made under protest, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive.

3. ☐ Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority



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Jean-Marc Fernandez

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9/13/02-F
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IMPORTANT INFORMATION

Bank and giro accounts of the
European Patent Organisation
for payments in

EUR

N° 3 338 800/11 (BLZ 700 800 00)

Dresdner Bank
Promenadeplatz 7
D-80273 München

N° 182000-805 (BLZ 700 100 80)

Postbank AG
Bayerstr. 49
D-80138 München

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 2-3 with 1; 17 with 16 and 1; 22-23 with 21

Dielectrical pump characterised by a first electrode configured to have a first potential applied to a first end of the electrode and a second potential applied to a second end of the electrode

2. Claims: 4,5 with 1

Dielectrical pump characterised by the microchannel being a continuous channel

3. Claims: 7,8 with 1

Dielectrical pump characterised by a microchannel that has at least one reservoir in fluid communication with the microchannel

4. Claim : 9 with 1

Dielectrical pump characterised by a substrate defining flow-restricting indentations into the microchannel having a size sufficient to restrain flow of a liquid through the microchannel

5. Claim : 10 with 1

Dielectrical pump characterised by a portion of the walls forming the microchannel having a coating applied thereon of sufficient hydrophobicity that the coating restrains flow of a polar liquid through the microchannel.

6. Claim : 11 with 1

Dielectrical pump characterised by the first fluid and the second fluid being liquids.

7. Claims: 12-15 with 1

Dielectrical pump characterised by a microchannel containing a third fluid in a portion of the microchannel that is not immediately between said first and second electrodes.

8. Claim : 18 with 1

Dielectrical pump characterised by a first portion of a microchannel having a cross-sectional area that is greater than a cross-sectional area of a second portion of the microchannel.

9. Claim : 26

A method of using dielectrical pumping comprising moving a fluid volume within a microchannel to react or analyse a biological or chemical sample

US4818052 discloses in its embodiment of figure 6 a pumping device comprising a substrate having walls which define a microchannel; a first electrode, and a second electrode, wherein said first and second electrodes are positioned to form a first capacitor having an electric field that traverses the microchannel, and wherein the microchannel contains a first fluid and a second fluid between the electrodes, said first and second fluids having a first interface therebetween and said first and second fluids having different dielectric constants such that the first interface between said fluids moves in the presence of the electric field, wherein the microchannel is a discontinuous channel having a first end and a second end; and wherein a third and fourth electrode are positioned to form a second capacitor having an electric field that traverses the microchannel. US4818052 further discloses the method of moving a first fluid in a microchannel, said method comprising placing an interface formed by said first fluid and a second fluid in an electric field generated by a capacitor having a first plate at a first potential and a second plate at a second potential, wherein said first fluid and said second fluid have sufficiently dissimilar dielectric constants that said interface moves in the presence of said electric field. US4818052 further discloses the use of the pumping device in an optical telecommunications device.

Therefore all features of claims 1,6,16,21 and 25 are known

From the comparison of US4818052 with the application the following technical features of claims 2-5,7-15,17-20,22-24 and 26 can be seen to make a contribution over this prior art (Special Technical Features (STF), Rules 13(2)):

Invention 1 (Claims 2-3 with 1; 17 with 16 and 1; 22-23 with 21)

New Features:	The first electrode is configured to have a first potential applied to a first end of the electrode and a second potential applied to a second end of the electrode
Objective Problem:	Provide for reversible motion with a single set of electrodes
STF 1:	The first electrode is configured to have a first potential applied to a first end of the electrode and a second potential applied to a second end of the electrode

Invention 2 (Claims 4,5 with 1)

New Features:	The microchannel being a continuous channel
Objective Problem:	Fluids may be returned to their points of origin as desired
STF 2:	The microchannel being a continuous channel

Invention 3 (Claims 7,8 with 1)

New Features: The microchannel has at least one reservoir in fluid communication with the microchannel
Objective Problem: Form a semi latching device by the pressure built up in a reservoir
STF 3: The microchannel has at least one reservoir in fluid communication with the microchannel

Invention 4 (Claim 9 with 1)

New Features: The substrate defines flow-restricting indentations into the microchannel having a size sufficient to restrain flow of a liquid through the microchannel.
Objective Problem: Achieve the desired balance between surface interactions and motive forces.
STF 4: The substrate defines flow-restricting indentations into the microchannel having a size sufficient to restrain flow of a liquid through the microchannel

Invention 5 (Claim 10 with 1)

New Features: A portion of the walls forming the microchannel has a coating applied thereon of sufficient hydrophobicity that the coating restrains flow of a polar liquid through the microchannel.
Objective Problem: Allow pumping of polar liquids
STF 5: A portion of the walls forming the microchannel has a coating applied thereon of sufficient hydrophobicity that the coating restrains flow of a polar liquid through the microchannel.

Invention 6 (Claim 11 with 1)

New Features: The first fluid and the second fluid are liquids.
Objective Problem: Provide desired dielectric contrast
STF 6: The first fluid and the second fluid are liquids.

Invention 7 (Claims 12-15 with 1)

New Features: The microchannel contains a third fluid in a portion of the microchannel that is not immediately between said first and second electrodes.
Objective Problem: The third fluid can be chosen based on other characteristics than its dielectric behaviour
STF 7: The microchannel contains a third fluid in a portion of the microchannel that is not immediately between said first and second electrodes.

Invention 8 (Claim 17 with 1)

New Features: The first portion of the microchannel has a cross-sectional area that is greater than a cross-sectional area of a second portion of the microchannel.

Objective Problem: fluid interface is restored by imbalance in capillary pressure

STF 8: The first portion of the microchannel has a cross-sectional area that is greater than a cross-sectional area of a second portion of the microchannel.

Invention 9 (Claim 26)

New Features: A method of using dielectrical pumping comprising moving a fluid volume within a microchannel to react or analyse a biological or chemical sample

Objective Problem: facilitate sampling in biological or chemical systems

STF 9: A method of using dielectrical pumping comprising moving a fluid volume within a microchannel to react or analyse a biological or chemical sample

Comparison of the different Special Technical Features of the nine inventions shows that they are neither the same, nor similar.

A comparison of the objective problems behind these inventions, seen in the light of the description and the drawings of the present application, indicates that there is no technical correspondance between these problems nor that they show any corresponding technical effect so that the Specific Technical Features of every one of the inventions fails to demonstrate a correspondance with any of the Specific Technical Features of any of the other inventions as required by Rule 13.1&2 PCT.

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS
OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PC, US 02/07923

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
1-3, 6, 16, 21, 25
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 818 052 A (LE PESANT JEAN-PIERRE ET AL) 4 April 1989 (1989-04-04) the whole document ---	1, 6, 16, 21, 25
X	US 4 505 539 A (AURACHER FRANZ ET AL) 19 March 1985 (1985-03-19) the whole document ---	1, 6, 21, 25
X	US 5 181 016 A (LEE YEE-CHUN) 19 January 1993 (1993-01-19) the whole document column 3, line 54 -column 4, line 10 -----	1 2, 3

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Patent Family Annex

Information on patent family members

International Application No

PCT, US 02/07923

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4818052	A	04-04-1989	FR 2548795 A1 EP 0136193 A1 JP 60052818 A	11-01-1985 03-04-1985 26-03-1985
US 4505539	A	19-03-1985	DE 3138968 A1 EP 0075704 A2 EP 0306604 A1 JP 58130320 A	14-04-1983 06-04-1983 15-03-1989 03-08-1983
US 5181016	A	19-01-1993	NONE	